

# CONTINUOUS IMPROVEMENT PROJECT DATABASE

## SAFETY IMPROVEMENT PROJECTS

Project Name	Project Description	Division	Project Year	Contact Name	Contact Number
Fence Post Puller	Prior method of post removal required the employee to manually pull up on the post while moving the post back and forth. This placed the employee at risk for back injury. Often this process was not successful and some employees used a backhoe to remove the post which can cause the post to be damaged and unable to be reused and/or the post exits the ground forcefully and can strike employees nearby. Sometimes a shovel was used to dig the post out. Under the proposed method using the puller tool the post is under control and exits the ground at a controlled rate. The employee uses the fulcrum based tool enhancing safety to the member, rate of production and the re-use of the post.	Div 3	2009	C Francka	(910) 371-2372
Easy Reach Straps	<p>It is a State Law and requirement to tarp all loads that are within 6" of the top rail on all trucks. The North Carolina Department of Transportation provides an automatic arm system tarp on all dump trucks. The arms automatically deploy the tarp using a spring tension system. This performs perfectly, but it has one problem. The tarp will not lay down when the equipment reaches certain speeds. It has a tendency to flop up and down sending the material being hauled into the roadway increasing the chance of damage claims from the traveling public. To prevent this from happening we secure the sides of the tarp with rubber tie downs. This function is preformed by climbing up the side of the dump truck and hooking a strap in a tarp ring. In doing this, the employees had to contend with falling hazards and structural failures. This was less than desirable from a safety standpoint.</p> <p>We have developed a simple way to improve a rubber tie down strap. Safety modifications to the rubber strap consist of enclosing the rubber strap with a 1 PVC plastic pipe. By modifying this rubber strap it eliminates climbing because the function can be preformed from the ground level.</p> <p>Division Eleven strives to excel and our safety philosophy is all accidents and injuries can be prevented. Observing our employees completing this task, we knew we had to re-engineer this task to solve the problem. This product has increased our efficiency and productivity. Our mission is to keep up with research and development of new safety devices.</p>	Div 11	2009	Matthew Oliverson	(336) 903-9235
Safe Storage of Chemicals	<p>NCDOT stores and uses chemicals in almost all of their processes and procedures. Safely storing and using these chemicals is an ongoing challenge. The Architect has developed a simple, color coded system for identifying and storing the chemicals with a system that can be used by all NCDOT Units, to increase the life safety in storage facilities for all NCDOT staff. This system of safe storage of chemicals was piloted in new Truck/material storage facilities for the Roadside Environmental Unit in Division 4, and the new Truck storage facility for the Roadside Environmental Unit and the Traffic Services Unit in Division 2.</p> <p>Solution: Using the North Carolina Building Code as a guide, all of the bid list chemicals from the Roadside Environmental and Traffic Services units were itemized and color coded by flash point. A spreadsheet was developed and provided that showed the maximum amount of each flash point (color) that could be safely stored in one control area (room), then the palette labels were color coded to match. As material is purchased and delivered, the user can then easily determine what material, and how much of each type, can be stored in each control area.</p> <p>This organizational system for safely storing chemicals will now be applied to all of the NCDOT building types; because the system is so simple and easy to implement, the program has created a much safer work environment for present and future NCDOT staff.</p>	General Services	2009	Randi Taylor	(919)715-0400

Pre-Trip Inspection Guidebook	<p>Students in multiple sessions of Division 14 Fleet Safety classes needed consistent, thorough demonstrations of the Pre-Trip Inspection (a requirement of CDL licensed operators and NCDOT policy) that all could view clearly as well as personal study guides for the procedure.</p> <p>A PowerPoint slideshow and a fully illustrated guidebook to accompany the presentation were developed using photographs and audio recordings of actual DOT vehicles. The slideshow can be presented at varying pace to accommodate circumstances and student/instructor needs. The guidebook provides versatility in that, while it is useful as a companion to the slideshow in class, it is also useful as a reference for new employees, employees required or wishing to improve their skills in the procedures, and for supervisors who oversee employees required to perform these inspections.</p> <p>Pre-Trip Inspection exams administered as part of Division 14 Fleet Safety classes show dramatically improved scores following implementation of the slideshow and guidebook. The numbers of equipment accidents reported in any month since the implementation of the slideshow and guidebook are lower than those recorded any other month of 2008.</p>	Div 14	2009	Candie Auvil	(828) 631-1182
Tail Gate Prop	<p>The operator of the dump truck needed a safe and effective way to clean off the tailgate apron after dumping only a partial load of gravel without causing injury to himself and/or others. It is necessary to clean all loose gravel from the apron before relocating the truck to prevent rocks from falling from the truck and causing possible windshield or body damage to vehicles which may be traveling behind the dump truck.</p> <p>After realizing the potential hazards of this operation, the Road Oil and Equipment Safety Awareness Team (Larry Thompson, Michael Garner, Terrell Reynolds) in Division 8 discussed a possible solution to the problem. They designed and fabricated a tail gate prop.</p> <p>The tail gate prop is user friendly for the operator. There are no safety hazards. It is inexpensive to fabricate, and if used correctly, should reduce the chance of injuries to hands, fingers, and arms. Fewer injuries means less lost work time and fewer worker's compensation claims, which could be a major cost savings.</p>	Div 8	2009	Larry Thompson	(704) 982-0101
Chain Caddy	<p>The process of manually cutting equipment chains to length required the use of a bolt cutter. This had to be handled by two people forcing the tool to be used in a manner that could cause injury.</p> <p>The solution to these problems is the Chain Caddy. This allows cutting of equipment chains in a controlled fashion greatly limiting the chance of slips, trips and falls during this task. Though the initial cost of the construction is about \$402.00, it will be quickly gained back by the savings in labor hours, one man vs. two, and the replacement cost of the bolt cutting edges. The Chain Caddy provides a safe and efficient task station where chains can be cut to length. It is a tool which can help eliminate injuries caused by slips, trips and fall.</p>	Div 9	2009	Mark Crook	(336) 249 7001
Shovel Retainer	<p>There was no proper location on the truck bed where a shovel could be secured. A shovel is always needed to clean excess material out of the truck bed and off the bed apron.</p> <p>Proper location was identified on the dump body for installation of the shovel holder. The holder was then designed, fabricated, and installed. The shovel holder will keep the shovel from collecting dirt and debris on the handles of the shovel. The truck operator now has the capability to pick up small dead animals off the highway while driving to and from the job site. This eliminates the need for sending out an additional employee, which would be a cost savings to the department.</p> <p>The operator no longer has to climb up on the bed to retrieve the shovel, which will prevent possible falls and muscle strains. The shovel is secured on the truck preventing the possibility of it falling into the roadway which could cause broken windshields, body damage, or even vehicle accidents.</p>	Div 8	2009	Stephen Thompson	(336) 896-7021
Straw Blowing Procedures	<p>During the straw blowing operations, operators were required to stand on the rear of a slick flat bed truck to feed bales of straw into the blower. No means was provided to prevent the employee from falling off and under the wheels of the straw blower being pulled behind.</p> <p>The solution was to build an approved handrail system that would help prevent someone from falling off the truck if they slipped. The blower chute on the blower was also modified to hydraulically raise and lower to clear the handrail system as needed to turn and cross uneven terrain.</p> <p>The handrail system provides a much safer workstation for employees to perform the straw blowing operation. The equipment is safer and user-friendly.</p>	Div 10	2009	Rick Mabry	(704) 596 2131

NCDOT-IMAP Training Ground	<p>There was no unified training for the IMAP drivers. Each IMAP unit trained differently and there was no internal communication. People were still making common errors that could lead to injury or even death. Quick Clearance was a new idea to the state and had not been integrated into any training regiments.</p> <p>Build a training facility where responders could receive actual training on incidents encountered in the field. This training facility could reach beyond NCDOT and other first responding agencies. The facility would also provide NCDOT the ability to video record the different training practices and to create a training film library that could be shared with other IMAP units, other NCDOT units, Contractors, and first responding agencies.</p>	Div 10	2009	Tim Kirk	(704) 982-0101
Video system on Centerline Paint Machine	<p>Division 10 Traffic Services received a new centerline paint truck in early 2008. The new truck is considerably larger than the previous truck and striping narrow, secondary roads is more difficult due to the size of the truck. The operator had to lean out the window of the new truck to see and this put the operator at risk for being hit by oncoming traffic, debris, etc.</p> <p>The solution had to include keeping a sealed cab. A video system with the camera mounted underneath the truck allowed maximum visibility. A monitor was also mounted inside the cab for the operator.</p> <p>The video system eliminated obstructions because it was placed under the truck for optimal viewing. Another benefit of this modification is the safety of the operator because he/she can stay inside the cab of the truck. This video system can be used by each and every paint crew across the state.</p>	Div 10	2009	Donald Griffith	(704) 982-1998
NC National Law Enforcement DMV Image Retrieval	<p>Problem: Law Enforcement officers could not easily verify the identity of individuals during roadside stops, if the driver did not have a photo ID.</p> <p>Solution: Working with several agencies, DMV made driver license photos appear along with driver data when officers search the network. Image retrieval data is available to participating states and other agencies</p>	DMV	2009	Carla Thorpe	(919)508-1753
Wireless Link Between Laptop Computer and Traffic Signal	<p>In order to use the laptop computer for programming, preventive maintenance, and troubleshooting traffic signal equipment, the technician has historically had only two options. The first was to remove the laptop computer from the truck exposing it to rain, sand, and other elements that reduced its usable life. The second option was to park the truck in close proximity to the signal cabinet and run a cable from the computer to the traffic signal equipment. This option places the technician, pedestrians, and the motoring public at risk of injury or death.</p> <p>The solution was to use 2.4ghz spread spectrum radio modems that can be compatible with various types of traffic control equipment.</p> <p>As a result of the implementation of the wireless connection, technicians are able to perform the required tasks with the trucks parked in areas that allow the greatest safety for technicians, pedestrians, and the motoring public. An unexpected benefit of the project is increased productivity from technicians who complete the required task using laptop computer.</p>	Division 1 - Operations & Traffic	2009	Leslie Newbern	(336) 315-7080
Positive Drug Testing	<p>In 2004, transit company representatives approached DMV with concerns that they had no way of identifying new hires who had been previously dismissed after testing positive on mandatory drug tests required of commercial drivers. The transit companies wanted to establish some way to mark a commercial driver license with information that the driver had previously failed a federally required drug test.</p> <p>DMV sought legislation that mandates that The employer of any employee who tests positive in a drug or alcohol test required under the Federal Motor Carrier Safety Administration (FMCSA) regulations shall notify DMV in writing within five business days following confirmation of a positive drug test. The legislation also provided for disqualification of the drivers.</p> <p>In the first 14 months of operation, this regulation has helped keep 273 persons with a drug and alcohol problem off the road. The law also creates an incentive for drivers to get treatment for their drug/alcohol problem and, thereby, have the disqualification removed from their record. Sixty-five (65) persons have taken advantage of this option for treatment.</p>	DMV - Driver and Vehicle Services Section	2009	Debbie Jones	(919)861-3231
Innovative Rumblestrips on US 421 in Chatham County	<p>A severe pattern of vehicles crossing the centerline developed on a two-lane section of US 421 from approximately SR 2119 to SR 1010 in Chatham County. Accidents resulted in high profile fatalities and severe injuries. With traffic volumes increasing and work beginning on the US 421 widening project, immediate action was required to attempt to eliminate the head-on type crashes along US 421 in Chatham County.</p> <p>A multi-unit team consisting of Division 8 staff, Sandhills Regional Traffic Engineering, Traffic Safety Systems, and Work Zone Traffic Control, was charged with developing and rapidly implementing an effective corrective countermeasure. The team developed and implemented the split centerline rumble strip configuration treatment.</p> <p>With the development and implementation of the split pattern centerline rumble strips, there has been significant reduction of the drift across center lane departure type crashes during critical construction phase.</p>	Traffic Operations & Investigative Section - Sandh	2009	Al Grandy	(910) 437-2614

Salt Spreader Stands	<p><b>Problem:</b> Division 10 Bituminous unit had 5 of our salt spreaders sitting on concrete barriers wall. Our operation for loading and unloading salt spreaders is to use the bridge department boom truck or use a front-end loader. An employee has to climb up the concrete barriers to get on top of the salt spreader unit. Once on top of the spreader, the employee hooks the four-legged chain. Then the employee has to climb down off of the spreaders using the concrete barrier as a stepping stool. After this operation is completed, the boom truck operator or loader operator takes control of the operation. There are two ground guides and a spotter; the spotter directs the truck operator to back up slowly. The two guides are holding onto the spreader, where it will not hit the ground or the back of the truck. As the truck is backing up, the operator slowly lowers the spreader into place. Once in place, the guides make sure that the spreader can be locked into place. Then the operator finishes lowering the spreader into the truck bed. Then employee climbs back onto the top of the spreader, and unlatches the chains from the spreader.</p> <p><b>Solution:</b> Division 10 Bituminous purchased 5 Swenson leg stands at a cost of \$2,495 each from Carolina Industrial Equipment. These stands have reduced the number of needed personnel, eases the workload on the crew, eliminates overhead hazards, prevents slips, falls and pinch points and frees up personnel. These stands provide for combined labor hour savings and safety improvement.</p>	Division 10 Roadoil Department	2008	Chip Speight	(704)-982-0714
Cutting 3/8" and 5/16" Grade 80 Chain with Torch	<p><b>Problem:</b> When cutting 3/8" and 5/16" grade 80 chain, we were having the shop to bring torch to the back of the parts department, pull out chain, measure and have technician cut when needed. Often flammable materials had to be cleared from the area before using this torch.</p> <p><b>Solution:</b> After the purchase of our electric chain cutter, we save time by cutting chain ourselves. Also, it is safer than using a torch.</p> <p><b>Results:</b> The results of this new process are a safer and faster way to fill chain orders.</p>	Division 10 Equipment	2008	Ricky R. Mabry	(704)-596-2131
Fatal Slip Reporting	<p><b>Problem:</b> Local town, city and municipality fatal crashes not being reported to the Traffic Safety Systems Management Section. To date only those crashes that are being investigated by NCSHP are reviewed and investigated for possible safety improvements to the area in which the fatal crash occurred. The fatal crashes that occur in these towns, cities and municipalities are not being reported accurately which accounts for approximately 24% of fatal crashes that are occurring in just the Eastern Region (Divisions 1, 2 and 4). When computed statewide many fatal crashes are going unnoticed. Were they less important?</p> <p><b>Solution:</b> Have local town, city and municipalities report, in the same fashion as does NC Highway Patrol, their fatal crashes to the Traffic Safety Systems Management Section for an investigation of the crash site for possible safety issues concerning the roadway. A Fatal Reporting Form has been developed to allow town, cities and municipalities to report fatal crashes that are occurring within their jurisdictions. This allows these agencies to receive the benefit of the Regional Traffic Investigation Teams to assess the area and to assist in providing solutions for safety improvements if needed.</p> <p><b>Results:</b> The results will be safer roads and highways within the state of North Carolina.</p>	NC DOT/Division of Highways	2008	Debroah Leonard	(252)237.6164
Sign Attachment Study	<p><b>Problem:</b> Isolated incidents of falling sign panels resulted in a statewide study of the welded studs used in attaching overhead sign. The study speculates that less than 10% of existing structures have significant stud failures.</p> <p><b>Solution:</b> The study recommends the use of an additional connection. Thru bolts placed in each interior panel, similar to existing requirements for end panels, will improve the safety factor.</p> <p><b>Results:</b>Standard drawings were revised to implement the current attachment practice.</p>	Congestion Management & Signing Unit Date	2008	Ron King	(919)662-4339

One Man Patcher	<p><b>Problem:</b> In 2004 after a heavy snow season followed by an unusually wet spring, the roads in the county were in very poor condition with many potholes. We had 5 patch crews working 6 days a week and could not keep up with the potholes.</p> <p><b>Solution:</b> We rented a patch truck made by Rossco from Interstate Equipment Co. The machine patches using tar and gravel and is self contained on a 33,000 GVW truck. This operation requires only one employee to operate, and one inmate to stop traffic if the patcher is around a curve or down a hill in a blind spot. The patcher approaches a hole, blows out loose material with compressed air then fills it with a combination of tar and No. 78 stone. On an average hole the process takes about 30 seconds to complete.</p> <p><b>Results:</b> This single truck (1 TW and 1 inmate) are able to patch on average 50 to 100 (140 has been max) holes a day. This operation is able to fill more holes than all 5 patch crews combined. Each conventional patch crew consisted of 1 TSI, 2 TW, 2 inmates, 1 crewcab dump, 1 tar kettle, 1 roller, 1 roller trailer. This patch truck not only helped to get the potholes under control but also has allowed us to spend less time on response and more time on preventative maintenance</p>	Div 10 / Union Maintenance	2008	David Gillette	(704) 283-5941
Tare & Gravel Vs. Cold Patch	<p><b>Problem:</b> When crews could not get asphalt from the plant they were using cold patch material to patch potholes. The cold patch material is very expensive – over double that of regular asphalt.</p> <p><b>Solution:</b> To minimize the amount of cold patch material used we went back to the old method of hand patching with tar and gravel. The cold patch material is now only used if plant mix is unavailable and conditions will not allow the use of tar and gravel.</p> <p><b>Results:</b> Tar and gravel is readily available on the yard and the least expensive material to use. Under proper conditions and if applied correctly the tar and gravel application provides as good a patch as any product. Utilizing this method of patching has cut our use of the more expensive cold patch material by 80 percent</p>	Div 10 / Union Maintenance	2008	David Gillette	(704) 283-5941
Aluminum Tailgates on Trash Trucks	<p><b>Problem:</b> Newell Maintenance has two flat bed trucks equipped to pick up and dispose of trash from the highway. These trucks were originally built with wood lift tailgates. They were heavy and hard to lift and store while dumping the load. Also, the wood was easily damaged if gates were dropped to the ground.</p> <p><b>Solution:</b> The Charlotte Shop designed, constructed, and installed new aluminum tailgates for the back of these trash trucks. The gates and holders have provided the employees easy access to the bed of the truck without having to strain with heavy wooden gates. Cables were attached between the gates and the truck bed to allow the gates to hang on the side of the body while the load is dumped. This prevents loss and damage to the gates. Sheeting for these gates was cut from used aluminum sign materials.</p> <p><b>Results:</b> This has reduced the chance for injuries, i.e., back strains and hand injuries.</p>	Division 10 Equipment	2007	Ricky R. Mabry	(704)-596-2131
Flip Sign Safety Latches	<p><b>Problem:</b> During events at Lowe's Motor Speedway, numerous ground mounted signs need to be changed to indicate which lanes are open and which lanes are closed. This is achieved with the use of flip signs. A flip sign is a sign that is cut in the middle and a hinge is installed allowing the sign face to be opened and closed. Personnel had to exit the vehicle and manually move a lever to flip a sign either up or down to inform the traveling public of a traffic control change during a race event. This resulted in personnel either walking around or standing atop one of the sign trucks within traffic control that was being changed or implemented. There are many distractions to drivers within race traffic including advertising, alcohol, scantily clad people, roadside sales, roadside parking, pedestrians weaving in and out of traffic, tour busses, the traffic control itself (counterflow and work barrels), etc.</p> <p><b>Solution:</b> Design a flip sign latch that was spring loaded so that personnel could quickly deploy or store traffic control information signs with a pole type tool that would activate the mechanism from inside the safety of s sign truck and keep traffic control convoy moving steadily.</p> <p><b>Results:</b> Safety is improved by allowing the sign erector to remain inside the vehicle while flipping signs. Previously NCDOT personnel would have to exit the vehicle and physically change the sign from the inbound to outbound pattern.</p>	Division 10 Traffic Services	2007	Donald Griffith	(704)-982-1998

Lube Bay Lighting	<p><b>Problem:</b> When vehicles were raised on the lifts for service, the lights were blocked causing poor lighting while under the unit.</p> <p><b>Solution:</b> The Charlotte Shop designed and constructed a way to add light under a piece of equipment while changing the oil. This was achieved by adding lights on the walls about four feet from the floor.</p> <p><b>Results:</b> This made it safer for employees to perform their duties with less risk of injury and eyestrain.</p>	Division 10 Equipment	2007	Ricky R. Mabry	(704)-596-2131
Propane Bottle Lift Sling and Storage	<p><b>Problem:</b> Equipment in the shop for repairs sometimes has propane bottles attached. If the bottles are full they sometimes will leak propane through the relief valve due to expansion from being in the heated shop area. Also welding maybe performed on/or in the area of the tanks. For safety reasons propane bottles must be removed from equipment in for repairs. The large bottles are too heavy to be handled by hand. The cap ring at the top of the bottle can not be used for lifting.</p> <p><b>Solution:</b> The Charlotte Shop designed and constructed a new way to remove and store large propane cylinders while equipment is being services. Bottles are removed/installed with the overhead crane and stored outside in holders away from fire sources. The lifting strap is approved for lifting propane bottles.</p> <p><b>Results:</b> This reduces the risk of fire inside the shop and helps prevent back injuries.</p>	Division 10 Equipment	2007	Ricky R. Mabry	(704)-596-2131
Shop Lift Attachment Holders	<p><b>Problem:</b> The Charlotte Shop has several lifts designed to raise vehicles for service. The lifts use attachments to adapt the lift to different trucks and were always lying around on the floor causing trip and lifting hazards.</p> <p><b>Solution:</b> The Charlotte Shop designed, constructed, and installed holders for the lift attachments. The holders provide employees easy access to the attachments without having to bend all the way to the floor or under a bench.</p> <p><b>Results:</b> This has reduced the chance for injuries including back strain and trip hazards.</p>	Division 10 Equipment	2007	Ricky R. Mabry	(704)-596-2131
Small Tire Changer	<p><b>Problem:</b> The Charlotte Tire Shop was having problems with tire repairs on small tires, i.e., the type on lawn mowers and other small equipment.</p> <p><b>Solution:</b> The Charlotte Shop designed and constructed a way to replace and/or repair small tires in a safer manner. This was achieved by attaching the small tire changer to an old rim, which is securely clamped in the larger tire-changing machine.</p> <p><b>Results:</b> This puts the small changer in a better working area and puts less strain on employee's back. While working up off the floor, there is less chance of slipping and less risk of injury.</p>	Division 10 Equipment	2007	Ricky R. Mabry	(704)-596-2131
Tailgate Removal Hammer	<p><b>Problem:</b> The Division Safety Committee developed the Tailgate Removal Procedures (submitted for an Award) to aid in the removal of tailgates from the back of Dump Trucks. Upon the removal of the tailgate, the Dump Trucks would be equipped with spreaders so the employees could apply salt, sand, and brine to the roadways during inclement weather. Injuries were occurring during the removal of the tailgates such as finger, hand incidents and one incident including a blow to the head of one employee.</p> <p><b>Solution:</b> The removal procedures were developed. In these procedures, a pin-removal and a Plastic Dead Blow Hammer were made to aid in the removal process. These hammers (fiberglass) were distributed to each location that was removing tailgates to place spreaders in the back of Dump Trucks.</p> <p><b>Results:</b> The hammers assisted in removing these tailgates off the back of Dump Trucks to place the spreaders on for inclement weather. Consequently, the employees would not need to use their hands to remove pins from the tailgate</p>	Div 10	2007	Darla H. Burris	(704) 982-0101

Safety and Traffic Operations Meetings	<p>Problem: The North Carolina Department of Transportation Safety and Mobility Policy requires that work zones be monitored during construction to enhance safety and reduce congestion and delays.</p> <p>Solution: The Safety &amp; Traffic Operation Meetings provide an opportunity for key stakeholders to discuss upcoming traffic shift, enforcement, speed limit, incidents, public information, and construction updates. Regular agenda items included upcoming traffic shift, enforcement, speed limit, incidents, public information, and construction updates.</p>	Division of Highways	2007	Jennifer Portanova	(919) 250-4159
New Construction of Oil/Lube Storage Building	<p>Problem: The existing lube storage building was too small to store the required lubes in a safe manner. There was very little mobility or access and there was a risk of injury any time stock movement was required. In addition, spill containment was a challenge.</p> <p>Solution: Employees at the Mt. Pleasant Shop in Division 10 built a larger building for the purpose of storing required lubricants.</p>	Operations Division 10	2007	Ricky Mabry	(704) 596-2131
New Shop Entrance	<p>Problem: After the Division Shop was constructed, the shop foreman's office, which is a work bay in the middle of the shop, was added. There was no outside entrance close to this office. Outside department employee traffic was forced to come through the main work area of the shop.</p> <p>Solution: The Charlotte Shop designed, constructed and installed a new shop entrance door. This door provides easy access to the shop foreman's office. Employees do not need to walk through the main work area of the shop.</p>	Operations Division 10	2007	Ricky Mabry	(704) 596-2131
Shop Lift Attachment Holders	<p>Problem: The Charlotte Shop has several lifts designed to raise vehicles for service. The lifts use attachments to adapt the lift to different trucks and were always lying around on the floor causing tripping and lifting hazards.</p> <p>Solution: The Charlotte Shop designed, constructed and installed holders for the lift attachments. The holders provide employees easy access to the attachments without having to bend all the way to the floor, or reaching under a bench.</p>	Operations Division 10	2007	Ricky Mabry	(704) 596-2131
Storage Building	<p>Problem: The Charlotte Shop has some tools that are seasonal and only used a couple of times per year. These tools were being stored in the rear work bay, making that bay unavailable for other use.</p> <p>Solution: Employees at the Charlotte Shop designed and constructed a new place to store these seasonal tools when not in use. A used Leonard Mobile Unit became available when the old Monroe Shop was decommissioned. This unit was installed outside the main shop area and is equipped to store and organize the seasonal tools and other miscellaneous spare parts.</p>	Operations Division 10	2007	Ricky Mabry	(704) 596-2131
Welder Storage	<p>Problem: The Charlotte Shop has a portable welder that is moved around the outside of the shop by forklift, but mostly stays outside the welding bay. Storing the unit outside the welding bay sometimes blocks the door.</p> <p>Solution: Employees at the Charlotte Shop designed and installed a new pad to store the portable welder when not in use. This provides easy access to the welder away from everyday shop traffic.</p>	Operations Division 10	2007	Ricky Mabry	(704) 596-2131
Plate Tamp Lift	<p>Problem: The Monroe Maintenance shop of Division 10 uses plate tamps for asphalt operations. These tamps weigh approximately 200 pounds. The tamps would have to be loaded onto the patch trucks by hand, and unloaded by hand when used. Operators complained of back stress due to lifting these heavy tamps.</p> <p>Solution: A truck mount hydraulic lift was designed and installed by the Monroe Shop. One prototype was put into service and tested. All patch crews have since requested these hydraulic lifts and they have been installed on all of the patch trucks in Union County. These lifts have been approved by the Division 10 Safety personnel.</p>	Operations Division 10	2007	Charles Hatley	(704) 283-6242
Overhead Sign Measurements	<p>Problem: To install the current lane closure signs, several departments and numerous employees had to be involved. The departments involved were: 1) Division Traffic Services signal and signs units; 2) Division Incident Management; 3) Local Police Department; 4) Highway Patrol. All total, 12 to 17 people were involved in the process. Division 10 has been researching ways to install signs on the interstate without having to have someone physically go up in a bucket truck to measure the sign to be installed.</p> <p>Solution: Park a vehicle on the shoulder of the road between employees and the oncoming traffic so that working personnel can extend a grade rod up to the sign structure. Another person can take a picture of the overhead sign along with the grade rod. Total time to accomplish this is less than five minutes. There has also been a reduction of employees involved down to 2 or 3.</p>	Operations Division 10	2007	Tim Kirk	(704) 342-6812.

Tailgate Removal Procedures	<p>Problem: In the past, removing tailgates from trucks resulted in injuries such as pinched or scraped hands and fingers, trauma to the head, and bruised or crushed toes and feet.</p> <p>Solution: Employees in Division 10 devised a safer procedure for removing tailgates. It involves the use of hoists, lift slings and D-rings to remove tailgates. The recommended method is as follows:</p> <ol style="list-style-type: none"> <li>1. Attach a lift sling to the tailgate; hook the center ring of lift sling to boom pole then lift boom pole until lift sling is taut.</li> <li>2. Remove pins from the tailgate. Use a fiberglass hammer and pin-removal hammer to remove pin from the tailgate.</li> <li>3. Transport the detached tailgate and place in the storage rack.</li> </ol> <p>The Specification Committee approved that all new dump trucks will be equipped with D-rings to aid in tailgate removal.</p>	Operations Division 10	2007	Darla Burris	(704) 982-0101.
Snow Plow Jack	<p>Problem: In the past when attaching and removing plows from the truck, employees were required to lift and strain with pry bars when performing this operation. Many employees suffered pinched fingers and the potential for back injuries was very high.</p> <p>Solution: Employees at the McDowell County Maintenance shop decided that the solution was to attach jacks to the side of the plow to adjust the plow to the correct height to attach and detach it.</p>	Operations Division 13	2007	Donnie Dockery	(828) 652-4024
Completing Highway Safety Improvement Program Investigations	<p>Problem: The Traffic Safety Systems Management Section identified 3,456 potentially hazardous locations statewide at the beginning of their two-year HSIP cycle in April 2005. With limited manpower, Traffic Operations and Investigations Section is charged with completing investigations, making recommendations, and developing improvement projects for as many of these locations as possible during the two-year cycle period.</p> <p>Solution: A full-time temporary engineer with almost 40 years of directly related traffic engineering and highway safety experience was hired to focus entirely on the task of completing HSIP investigations and developing treatments/countermeasure projects.</p>	Preconstruction - Traffic Engineering	2006	P.H. Daughtry	(252) 296-3522
Innovative Centerline Rumble Strips on US 421 in Chatham County	<p>Problem: A severe pattern of vehicles crossing the centerline developed on a two-lane section of US 421 from approximately SR 2119 to SR 1010 in Chatham County. These types of accidents resulted in several high profile fatal and severe injury crashes. With traffic volumes increasing and work beginning on the US 421 widening project, immediate action was required to attempt to eliminate the head-on type crashes along US 421 in Chatham County.</p> <p>Solution: A multi-unit team consisting of Division 8 staff, Sandhills Regional Traffic Engineering, Traffic Safety Systems, and Work Zone Traffic Control, was charged with developing and rapidly implementing an effective corrective countermeasure. The team developed and implemented the split centerline rumble strip configuration treatment.</p>	Preconstruction - Traffic & Operations - Division	2006	Renee Roach	(910) 437-2614
Redesign of Survey Equipment Box	<p>Problem: A survey equipment box on the work vehicle is used in both transporting engineering equipment and storing supplies while simultaneously providing quick access. The standard plywood equipment box and Lexan shield installed in the rear cargo area prevent safe operation of the vehicle. The height and position of the box combined with the shield's construction significantly reduces visibility and impairs the operator's ability to safely back-up the vehicle and monitor rear-approaching traffic.</p> <p>Solution: A newly designed survey equipment box was built and installed. The new box increased rear visibility to the original equipment manufacturer's specifications. The new box is constructed from 16-gauge mild steel sheeting providing improved containment of the equipment.</p>	Preconstruction - Highway Design	2006	Charles Brown	(919) 250-4109
Actuated Signal Warning Flasher at "Dowdle Mountain	<p>Problem: The Division Traffic Engineering Team is Division 14 was assigned to install a traffic control signal on a high-speed four-lane highway. The problem was that some traffic, traveling above the 55 mph speed limit, would be in a different dilemma zone due to traveling at a speed outside the design parameter. The dilemma zone is the area in advance of a traffic signal where approaching traffic is unsure whether to try to stop or to proceed through the intersection. The team wanted to communicate to the driver a warning, at the appropriate point, that the signal is changing to red and that the driver needed to slow down and stop.</p> <p>Solution: The team decided on a Traffic Signal Ahead warning sign with flashing warning beacons that were connected to the signal and only flashed when the signal indication was amber or red.</p>	Operations - Division 14	2006	Reuben Moore	(828) 586-2141

Equipment Handling Stands	<p>Problem: The Bituminous Unit in Division 11 have had several safety issues with their old equipment hangers, such as, hazardous climbing, working under suspended loads, and pinch points. The equipment was loaded and unloaded with chain hoists and loaders. This has led to personal injuries and mechanical failure</p> <p>Solution: The Bituminous Operations team recommends a new product that will improve safety. This product is the Stands Alone Equipment Handling Stands which needs no chains or hangers to function. The mainframe, stringers, supports and legs are fabricated using structural steel tubing. The equipment stand has a manually operated safety lock and latch with a full width roller and bumper bar. All that is required is to back under the stand with bed raised, then lower the bed; the equipment actually loads itself.</p>	Operations - Division 11	2006	Matthew Oliverson	(336) 903-9235
Safety Handrails for Sign Erector Trucks	<p>Problem: Division 10 inspects all new equipment prior to utilization for proper safety devices. It was determined that the sign erector truck did not provide for the proper mounting and dismounting at the rear of the vehicle. Employees mounted and dismounted their vehicles using unstable or unsafe means of third point contact.</p> <p>Solution: The installation of additional grab handles to the rear cargo area of the sign truck allows Division 10 Traffic Services to meet Standard Operation Procedures, as well as nationwide safety standards set for mounting and dismounting of equipment.</p>	Operations - Division 10	2006	Donald Griffith	(704) 982-1998
Sign Board Safety Mirror	<p>Problem: The Incident Management Assistance Program (IMAP) drivers in Divisions 7 and 9 were having trouble verifying that the arrow board was up and functioning properly without getting out of the truck to visually inspect the board.</p> <p>Solution: In order to lower the risk of drivers being struck by passing motorists, a sign board safety mirror was placed on the truck to view the arrow board from inside the cab of the truck.</p>	Operations - Divisions 7/9	2006	Sam Whittington	(336) 315-7080
Brantley Vise	<p>Problem: The problem was to eliminate the risk of equipment damage and/or personal injury from routine handling of the 50-pound weights used to secure the volumeter during density tests for embankments.</p> <p>Solution: An employee in Division 4, Resident Engineer's Office - Wilson, designed and fabricated a portable, lightweight volumeter/molding securing vise, weighing only 11 pounds. This device was named the "Brantley Vise. This devise has a simple design, is relatively inexpensive, and is easy to fabricate.</p>	Operations – Division 4	2006	Dennis Brantley	(252) 237-6164
Crossing Signal Construction Inspection Process Improvement	<p>Previously applied methods of crossing signal construction inspection were proving less adequate due to the advance in technology and construction methods in the railroad industry. Rail Division Crossing Hazard Elimination Unit Construction Project Engineers, in conjunction with NCDOT and Federal Railroad Administration (FRA) Signal Inspectors, determined that the former construction inspection method required improvement in crossing signal functional and operational parameters to meet Federal regulatory requirements and the public safety purpose of crossing safety projects.</p> <p>Construction Project Engineers developed and refined the crossing signal construction inspection process and checklist, with input from Unit and Branch management, NCDOT and FRA Signal Inspectors, and key railroad company personnel.</p>	Transit - Rail Division	2005	Donald Hudson	(919) 715-7295.
Toe Scour Protection System	<p>Rains from the 2004 hurricane season caused a massive amount of damage to western North Carolina. Interstate I-40, which is the major transportation artery between North Carolina and Tennessee, was closed when several landslides occurred near the NC-Tennessee border.</p> <p>The Highway Design Branch was directed to design a solution that would repair the slopes and open I-40 as soon as possible. A significant amount of coordination and teamwork between the Highway Design Branch, Construction Unit, and Division 14 was required to complete the design work and contracts within 23 calendar days. The Geotechnical Engineering Unit, Structure Design Unit, and the Hydraulics Unit developed a new solution to prevent future erosion at toe of repaired slopes and preserve the safety of the traveling public.</p>	Preconstruction-Highway Design Branch	2005	Nilesh Surti	(919) 250-4088

Tailgate Safety Meeting Plan and Report	<p>In January 2004, Division 14 experienced a workplace fatality. An employee committed a violation of Safe Operating Procedure and disregarded a supervisor's direct instruction. The employee placed himself in danger and was run over by a Blaw-Knox shoulder building machine. The incident investigation team received conflicting information regarding the conduct of the required tailgate safety meeting.</p> <p>The Safety Programs Subcommittee reviewed existing literature regarding the workplace safety program and designed a survey for Division 14 to report on current practices with tailgate safety meetings. The survey resulted in an identified need for a formalization of the process of planning and reporting on tailgate safety meetings. The committee refined the Tailgate Safety Meeting Plan and Report form for crew leaders and supervisors to use.</p>	Operations-Division 14	2005	Reuben Moore	(828) 586-2141
Engineering Control for Lead Work	<p>It is a common practice to use fans to blow smoke away from cutting and welding operations. Division 7 Bridge Maintenance had difficulty positioning fans and maintaining airflow across the intended work area especially between I-Beams underneath bridges.</p> <p>Northern Industrial Tools Blue Blower has proven to be a compact fan that can be positioned easily to blow smoke away from welders. A powerful, portable blower moves up to 300 cubic feet per minute (300 CFM on high; 200 CFM on medium; 100 CFM on low), up to 30 feet away. Adjustable air direction controls heat, fumes, odors and dust. This fan system includes a 12-foot, 14-gauge grounded cord, 2 built-in 15 Amp grounded receptacles for power tools, a 115 volt motor and is UL approved.</p>	Operations-Division 7	2005	Tim Powers	(336) 375-5589
Soules Swamp Boardwalk	<p>US 701 Business crosses Soules Swamp on the south side of the City of Whiteville. The swamp is approximately 1000 ft. wide and separates a low-income residential area from a shopping district. Although there was a bridge with a 5-foot sidewalk across the run of the swamp, there was no sidewalk up to the bridge on either side. People were trying to cross the swamp on foot, usually by walking very close to or even on, the roadway, creating a serious safety hazard between pedestrians and the motoring public. Structural analysis of the existing infrastructure, such as concrete piers anchoring a sewer main, revealed that the piers could support additional weight. The solution was to construct a wooden boardwalk on top of the sewer main, using the concrete piers for footing support, in those areas where the existing shoulder was too narrow for a conventional sidewalk. In those areas where the shoulder was wide enough, a standard 5-foot wide concrete sidewalk was constructed.</p>	Operations-Division 6	2005	R. Allen Waddell	(910) 642-3760.
Better Safety Meetings	<p>Incident reports are generated every month based on incidents and injuries that have occurred over the previous month. A committee involving employees from the area in which the incident occurs reviews these incidents and injuries and forwards their recommendations to the division safety meeting. Reports completed in the field have the advantage of being familiar with the area in which the incident occurs.</p> <p>To adequately review incidents at the division level, a PowerPoint presentation was developed to show every incident and injury that has occurred. Pictures from every incident and injury are taken soon after the incident has occurred to view the location, damage and possible causes of the incidents. Corrective action(s) can be determined after review. After the incident review meeting, the employees' names are removed from the PowerPoint and it is shown at the safety meeting.</p>	Operations-Division 4	2005	Deborah Leonard	(252) 237-6164
Preplanning Typical Repairs	<p>The normal procedure for highway maintenance is to plan repairs as needed and perform preventive maintenance as much as possible. The traffic control during routine maintenance can be dangerous as well as counterproductive. The action taken to eliminate much of the routine traffic was to preplan and perform routine maintenance such as crack pouring, patching, overlays, shoulder repairs and ditch cleaning on roads that have been closed for bridge replacements.</p> <p>NC 403 and SR 1006 are normally two heavily traveled roads. Setting up and maintaining traffic control require a lane closure as well as a pilot truck. The local resident engineer was contacted to coordinate the work during the time of a bridge replacement on each of these two roads.</p>	Operations-Division 3	2005	L.E. Reynolds	(910) 592-1434.

Safety Awareness Wristband Promotion	<p>Awareness wristbands have recently become very popular. These bands are used to raise awareness of various diseases and other items of special interest.</p> <p>The Safety Workshop Committee in Division 2 wanted to find a good way to promote safety and get all Division employees involved. Since a lot of employees were already wearing various awareness wristbands, the committee decided that the use of wristbands with a safety motto would help promote safety awareness throughout the Division.</p> <p>Orange wristbands with NCDOT DIV. 2 NO ONE GETS HURT inscribed on them were ordered and distributed to all employees.</p>	Operations-Division 2	2005	John Wells	(252) 830-3146.
Swivel Winch	<p>There are five main problems associated with the daily task of the removal of debris and dead animals from the roadway: 1. Two or more employees are needed to remove large animals, 2. The handling of carcasses which have begun to decay or been mangled by vehicles, 3. Retrieval and removal of animals down steep slopes or across ditches, 4. Raising large animals into the back of dump trucks to be taken to disposal sites, and 5. Having enough shoulder to allow the truck to get off the road during loading. There was a need for a device that would enable a single employee to perform this task in a safe and timely manner. The solution was the development of the truck mounted swivel winch. The winch is mounted in the back corner of a pickup truck and utilizes a cantilever type structure which aids in the lifting action needed to raise a large animal into the truck. The supported weight is then swiveled into the bed of the truck by means of a flange bearing. The winch is equipped with 250 feet of cable and the sling is made of a 24-inch wide cold feed belt.</p>	Operations-Division 1	2005	Retha Leigh	(252) 797-4598.
Online Defensive Driving Course	<p>The Materials and Tests (M &amp; T) Unit staff members drive a combined 2.2 million miles a year in a variety of vehicles provided by both the NCDOT Equipment Unit and by DOA Motor Fleet Management. As part of an ongoing Unit goal to improve safety both in the workplace and in the lives of the Unit's employees, a defensive driving class was arranged.</p> <p>The National Safety Council was contacted and their on-line defensive driving course was made available to all M &amp; T Unit employees. After completion of the course, the provider administered a test on-line and certificates were presented for successful completion of the course. All 186 members of the M &amp; T Unit took and passed the course.</p> <p>Arrangements were subsequently made for the Construction Unit's staff to participate in the program.</p>	Construction-Materials and Tests	2005	Randy Pace	(919) 733-7091.
NC Executive Committee for Highway Safety	<p>While major strides have been made in highway safety in North Carolina over the years, in 2003 there were 231,247 reported traffic crashes that resulted in 1,552 persons killed and over 134,000 injuries on our highways. After ten (10) months of coordinating the many safety initiatives within and outside of NCDOT, the N.C. Executive Committee for Highway Safety (ECHS) was formed and held its first meeting. The ECHS identifies, prioritizes, promotes and supports the AASHTO Strategic Highway Safety Plan (SHSP) in North Carolina's highway safety strategy to save lives and reduce injuries. It is comprised of six active Working Groups, each assigned a specific emphasis area to analyze problems and developing specific strategies and countermeasures.</p>	Department of Transportation	2004	Cliff Braam	(919)-733-3915
Regional Traffic Safety Council Robert Waterhouse	<p>In 2003, there were 250,933 reported traffic crashes in North Carolina that resulted in a total of 1,559 persons killed and 134,00 injuries on our highways. The NC Executive Committee for Highway Safety (NCHS) was formed in April 2003 to identify, prioritize, promote and support all 22 key emphasis areas in the AASHTO Strategic Highway Safety Plan (SHSP). The Executive Committee adopted the national goal of 1.0 fatalities/100 MVM (million vehicle miles of travel) by the year 2008. Presently, North Carolina's rate is approximately 1.6 fatalities/100 MVM. In an effort to reach the goal of 1.0/100 MVM in North Carolina, NCDOT representatives held meetings with the Executive Director of the Piedmont Authority for Regional Transportation (PART) to establish a safety council made up of representatives from rural areas of the Piedmont area. This council would assist the rural areas and give those citizens a place to turn with their safety issues and/or problems.</p>	Preconstruction-Traffic Engineering	2004	Vickie Embry	(336) 896-7037
Revised Rumble Strip Policy	<p>The old guidelines for rumble strips used by the NCDOT specified that rumble strips should only be placed on the following types of median divided roadways: Interstate Through Routes, Rural Freeway Segments, and Expressway Segments that are located in sparsely developed rural areas. Rumble strips are raised or grooved patterns that are placed along paved roadway shoulders to provide both an audible warning (i.e., rumbling sound) and a physical vibration. As drivers drift beyond their designated travel lane, the warning alerts the motorist that a steering correction is required. Recognizing the growing run-off-the-road (ROR) safety problems and the fatigued and distracted driver benefits of continuous milled rumble strips, an aggressive effort to reduce the number of ROR crashes was initiated by the NC Board of Transportation and North Carolina's Executive Committee for Highway Safety.</p>	Preconstruction-Highway Design	2004	Roger Thomas	(919)250-4016

Rest Area Safety	In 2003, NCDOT engaged the qualified assistance of Edwin Weaver, PE of the NCSU School of Civil Engineering for a comprehensive study of the 61 North Carolina rest areas. The purpose of this study was to justify the levels of funding allocated to backlog maintenance and for necessary facility upgrades. The information gathered during the study provided NCDOT with the current condition of the rest area sites as well as an overall inventory of the infrastructure components (restroom buildings, vending buildings, picnic tables and shelters, HVAC, plumbing, etc.).	Construction-Roadside Environmental	2004	Tad Davis	(919)733-2920
Transportation Notification System	Federal Motor Carrier Safety Administration Regulations required commercial trucking companies and transportation companies to request a motor vehicle report (MVR) from each driver on a semi-annual basis. Transportation companies advised DMV that there were little to no voluntary driver reports on traffic convictions, license suspensions or license cancellations nor commercial driver license disqualification outside of the required semi-annual MVR checks. The North Carolina Division of Motor Vehicles took the initiative to develop a computer system that would give companies access to real time driver license record reporting. The NC DMV (Driver License Section) and the Transportation Information Technology team developed a proof of concept system known as the North Carolina Transportation Notification System (TNS).	Division of Motor Vehicles	2004	Barbara Webb	(919)861-3299
Move It On Over Public Awareness Campaign	Based on national statistics, approximately 50% of the nation's congestion is due to unplanned traffic incidents. Secondary crashes account for approximately 20% of vehicular crashes and approximately 18% of freeway fatalities. The Move Over Law and the Fender-Bender Law both deal with the movement of vehicles and motorist safety along North Carolina's highways. However, the public was not aware of the relatively new laws. A committee was formed with representatives from NCDOT, NC State Highway Patrol, Governor's Highway Safety Program, NC Trucking Association, and Federal Highway Administration in an effort to develop a public awareness program for the two laws.	Department of Transportation	2004	Rob Stone	(810) 944-2344
Tailgate Pin Punch	The removal of dump truck tailgate pins often resulted in smashed fingers and hands. In order to prevent this safety hazard, an inexpensive hand tool was created to assist in the removal of the tailgate pins. A simple piece of soft stock steel machined down to the proper diameter and length with a handle attached. A dead blow hammer was used to prevent the metal from shearing.	Operations-Div 10	2004	John Edmonds	(704) 596-6900
False Floor	In order to access equipment from the bed of traffic services trucks, it was necessary for operators to keep getting up and down in the back of the truck several times during the workday. Team members in the Division 10 Charlotte Shop designed, constructed and installed a false floor for the bed of their service trucks. Under the floor is a spot for signs, poles, and any hardware needed to install and repair signs. The truck operators now have easy access to the equipment.	Operations-Div 10	2004	Robert Waterhouse	(704) 596-2123
Parts Truck Modification	Personnel in the Division 10 Newell Parts Department discovered that the parts delivery truck needed stronger sides as well as a stronger headboard in the box part of the truck. They installed plywood and handrails to the sides of the box interior to secure the parts being transported daily to the shops within Division 10.	Operations-Div 10	2004	Jonathan Rinehardt	(704) 596-2123
Containment Area for Fuel Truck	In the past, there was no containment area for possible fuel or lube spills from the fuel truck. The Anson Shop personnel in Division 10, with the help of the Department of Corrections, constructed a covered parking area for the Anson Shop fuel truck. This area also provides a containment wall in the event of a fuel or lube spill from the fuel truck.	Operations-Div 10	2004	Eugene Cash	(704) 694-2636
Improved Paint Markings	Newly paved contract roads are striped in two ways, either with paint or long life markings which is usually thermoplastic. On contract paint roads, there have been problems with the edge-line radii and the white mini skips wearing out before the rest of the road did. Mini skips are a paint line 4-inches wide and two feet long with an eight-foot gap between the mini skips. They are a continuation of the edge-line at intersections that help motorists on the main road continue to follow the flow of the road. They also help motorists on the intersecting road decide how far they can safely pull up at the intersection. A decision was made to add in the contract for these newly paved roads that the radii and the mini skip lines at intersections be put in with thermoplastic and that the width of the mini skips be increased to 6-inches.	Operations-Division 7	2004	Larry Lashley	(336) 256-0551
Caswell Lighting	During the adverse weather season of 2003, the existing lights in the Caswell County Maintenance yard did not provide adequate lighting to work in a safe and efficient manner. At that time, there was only one area light at the salt storage area. Two more area lights were located at the front of the maintenance yard. The only way to work safely with the existing lighting was to use headlights from dump trucks and flashlights. This was an unsafe working environment for the employees working throughout the night during adverse weather conditions.  To correct this problem, the Caswell Safety team contacted local electrical contractors to provide bids to install 18 400-watt high-pressure sodium lighting fixtures onto the existing poles. The contract was awarded and the lighting fixtures were installed	Operations-Division 7	2004	Cindy Schrodt	(336) 694-6101

Scaffold Attachment for Concrete Headwall	There have been problems working on back side of a concrete headwall form. The Alamance Bridge Maintenance team made a 2' high X 3' wide angle and used 2-3/4 inch anchor bolts to anchor the form to the headwall. Once the scaffold supports were fabricated, they can be used whenever needed.	Operations-Division 7	2004	A.C. Levens	(336) 375-5589
Quick Connect Snow Plow	The current process of connecting snow plows to truck frames usually required 3-4 employees, a sledgehammer, a pry bar and 10-15 minutes. Also, the process required employees to be between plow and truck. A Stokes County maintenance team fabricated parts and modified their plows & frames using a quick connect system based on the PennDOT's in-house design. New design now takes 1 person 2 minutes to connect the plow to the frame and also reduces employees exposure to safety hazards.	Div 9	2003	Kent Boyer	(336)593-8541
Access Management	Due to poor past management of street and driveway access, the state highway system is operating below its original intended purpose. Because of numerous points of access/conflicts, safety is compromised, capacity is being reduced and driver workload is diminished due to poor management of side street conflicts. An NCDOT Access Management policy has been developed and recently implemented. Access Management has the potential to save the traveling public as much as \$240 million per year in crash costs alone. The goal is to enhance road safety, improve motorist mobility and reduce environmental impacts.	Traffic Engineering	2003	Gary Faulkner	(919)250-4151
Air Compressor Air Hose Renovation	Rockingham County Maintenance Unit identified a problem in changing attachments on hose of compressor. Compressor coupling would wear due to twisting of hose during use which caused wearing of threads on coupling. Hose would sometimes disconnect under pressure which caused a safety hazard Employee suggested replacing threaded coupling with a quick couple coupling. For total cost of \$40.32, fast and easier connections can be made and since the hose swivels freely there are no twisted or kinked hoses.	Div 7	2003	L.R.Presnell	(336)634-5642
I-95 Work Zone Team	From a traffic safety standpoint, construction work zones are problematic because they present drivers with changes to the roadway environment (i.e., lane restrictions, changes in alignment, absent or poor centerline, absence of paved shoulder, etc.). The increased risks associated with these conditions are accentuated by high vehicle speeds and motorists who follow too closely. NCDOT attempts to maintain throughput without creating unsafe speed differentials often result in little or no posted reduction in vehicle speeds. Because of the constrained roadway and shoulder environment in the work zone, traditional enforcement operations are difficult, limited for the most part to officers and vehicles positioned in advance of the work zone or merge points with blue lights flashing.	DIVISION OF MOTOR VEHICLES	2002	Lt. Mark Nichols	(919)861-3185.
GPS/GIS Application for Commercial Motor Vehicle Enforcement	The Motor Carrier Safety Assistance Program (MCSAP) administered by NCDMV Enforcement is responsible for commercial motor vehicle safety efforts statewide. These efforts are managed out of eight (8) districts. The present pilot project involves the implementation of Global Positioning System (GPS) and Geographic Information System (GIS) technologies in the 12-county area covered by District III. The NCDOT Engineering Applications Group developed a specifically designed GPS event capture capability. By entering enforcement events and their geo-specific locations into the same GIS database environment as (truck-involved) crashes, NCDMV Enforcement will be able to relate the spatial and temporal characteristics of specific commercial motor vehicle (CMV) enforcement activities. The system also documents enforcement vehicle location on a continuous basis (i.e., every 5 minutes).	DIVISION OF MOTOR VEHICLES	2002	Capt. George Gray	(919)861-3185.
Truck Mounted Impact Attenuator Cab Mounted Controls	The Roadside Environmental Unit conducts many slow-moving spraying operations on multilane primary and interstate highways. A caravan of four vehicles is used for the operation, one of which is a protection vehicle with a truck mounted impact attenuator. To begin operations, the entire caravan needs to find a safe place to pull off of the road so that the operator of the protection vehicle can lower the impact attenuator. This takes approximately 15 minutes, and the operator has to exit the cab of the truck, walk to the rear of the truck, and stand between the impact attenuator and the rear of the truck. This is necessary because of the location of the switches and indicator lights. Throughout this procedure, the operator is exposed to dangerous high-speed traffic.	OPERATIONS - DIVISION 13	2002	Keith Hill	(828) 251-6253.
Work Zone Signing Removal	Work zone signs that are not removed from the project at the completion of the project are a safety hazard to the traveling public and DOT maintenance operations. This problem occurs most often on contract resurfacing projects. These projects have a large number of signs scattered over many locations. When work zone signs are abandoned on the project, it is only a matter of time before the sign and upper U-channel post are removed by passersby or damaged. Once the upper U-channel posts are gone the lower U-channel posts that remain are the real safety hazards. These posts are easily concealed in the grass on the shoulder and could cause damage to right-of-way mowing equipment and vehicles that pull off onto the shoulder.	OPERATIONS - DIVISION 9	2002	Mark Crook	(336) 249-7001

Guardrail Spraying Improvement	The guardrail spraying operation consisted of a 1000 gallon skid mounted sprayer on the back of a flatbed truck with two men leaning over the side of the truck spraying the front and back of the rails with herbicide using hand-held spray guns. This operation can be very dangerous on a multilane interstate with traffic volumes of 125,000 vehicles a day. Using the hand-held spray guns also limits the width of the area being sprayed. The area in front of the guardrail to the edge of pavement cannot be reached with the handheld spray gun, so a second round was necessary to apply herbicide to this area. This procedure doubles exposure to the herbicides, as well as to heavy traffic since the equipment must operate on the shoulder or in the road.	OPERATIONS - DIVISION 7	2002	Ken Taffer	(336) 334-3192
Improved Structured Flagger Training for All New Hires	Historically, scheduled and structured flagger training was only offered by ITRE once a year to the field maintenance employees. Since classes were limited, veteran employees who may or may not have been qualified to train new employees were assigned as mentors to the new hires. Both good and bad habits were passed on to new employees. By the time ITRE classes were available, the new employees may have been assigned to flagging duties for more than a year. As a result, the ITRE classes were ineffective. To end the cycle of poor flagging, the Alamance Maintenance CPI team worked with ITRE to increase the number of qualified trainers. All of the Transportation Supervisors were sent to the ITRE course for Flagger Instructor Training	OPERATIONS - DIVISION 7	2002	Michael Venable	(336) 570-6833
Pipe & Culvert Automated Video Inspection	Historically, scheduled and structured flagger training was only offered by ITRE once a year to the field maintenance employees. Since classes were limited, veteran employees who may or may not have been qualified to train new employees were assigned as mentors to the new hires. Both good and bad habits were passed on to new employees. By the time ITRE classes were available, the new employees may have been assigned to flagging duties for more than a year. As a result, the ITRE classes were ineffective. To end the cycle of poor flagging, the Alamance Maintenance CPI team worked with ITRE to increase the number of qualified trainers. All of the Transportation Supervisors were sent to the ITRE course for Flagger Instructor Training.	OPERATIONS - DIVISION 7	2002	Michael Venable	(336) 570-6833
Rut Measurement Tool	Every two years a condition survey of the paved road network is performed on all state maintained primary, secondary, and urban systems. Raters had to get out of the car and measure rutting at least once per day by using a straight edge and ruler at ground level. While the current procedure is performed quickly, it was necessary for the raters to be in a travel lane with on-coming traffic in either a stooping or squatting position trying to get a measurement from a smaller ruler. An added hindrance to the process was the direct sunlight and glare for employees wearing glasses/bifocals.	OPERATIONS - DIVISION 8	2002	Harold Matthews	(910) 582-7075.
Hydraulic Cylinder Safety Lock	The neat appearance of our highways is a top priority within the State of North Carolina. Thus, mowing is a vital part of maintaining the neatness of our highway system. It is often necessary for the mowing operator to get under a rear-mounted mower to replace blades or remove material caught in the reel, which results in a safety hazard for the operator. In addition, hauling mowers back to the shop for these minor repair results in lost efficiency and increased labor costs.  The Division 8 Equipment team developed a device to make it safer for an operator or mechanic to work underneath a rear-mounted mower without the risk of the lift falling.	OPERATIONS - DIVISION 8	2002	Gary Nance	(910) 947-2721.
Pin Driver	Currently, sledgehammers are used to drive pins for ABC nuclear density tests. This process is time-consuming, labor intensive, and can create unsafe working conditions. The CPI team in the Wilson Resident Engineer's Office of Division 4 proposed the use of a demolition hammer to drive these pins. For trial purposes, the team borrowed all the equipment needed from the Division 4 equipment shop. That equipment included a portable generator, a demolition hammer, and a ground rod bit. They ran the test using a demolition hammer on 10 test sections that include 5 holes each for a total of 50 holes. The readings from each of these holes were compared to an adjacent hole that was prepared using the conventional method of driving the pin with a sledgehammer.	OPERATIONS - DIVISION 4	2002	John Finnell	(252) 237-6164
Overhead Power Line Covers	Backing up trucks with raised beds and leaving a dumpsite with a raised bed often results in the bed coming in contact with overhead power lines. In fact, approximately 17% of construction accidents with dump trucks involve electrocution. NCDOT has also had problems with equipment such as cranes, backhoes, and boomed equipment coming in contact with power lines. In order to ensure safety of workers, Division Four purchased covers that are lime-yellow in color to fit over a 28 traffic cone. These cone covers can also be used with the 36 cones that are already in stock.	OPERATIONS - DIVISION 4	2002	Deborah Leonard	(252) 237-6164.

Portable Shade Tree	<p>When mechanics work on equipment that has broken down on the road, it is often in extreme heat and direct sunlight. This often leads to heat exhaustion, fatigue, sunburn, and using tools that are extremely hot.</p> <p>This situation lead to the development of the Portable Shade Tree. This is an umbrella that is mounted on a magnet that can be easily attached to a piece of equipment. Using the wing nut attached to the mounting bracket and repositioning the magnet, this portable shade tree can be positioned in any direction to counter the angle of the sun to provide shade.</p>	OPERATIONS - DIVISION 4	2002	Joe Nelson	(252) 583-4221
Warning Sign for Low Utility Lines	<p>Over a three-year period, Division maintenance and construction departments experienced about six accidents where power and utility lines were knocked down by equipment. The Division Safety Committee was faced with the challenge to develop countermeasures to reduce or eliminate these hazardous incidents, which posed potential fatal conditions not only to the equipment operators and employees, but also to the traveling public.</p> <p>Division 12 Traffic Services Department fabricated a warning sign (Low Utility Lines) and made this sign available to all departments that had equipment (i.e., dump trucks, backhoes, etc.) which were susceptible to accidents involving power lines. The purpose of this warning sign was to provide a constant reminder of the presence of power and utility lines.</p>	OPERATIONS - DIVISION 12	2002	Reuben Chandler	(704) 480-9021
Advance Flashing Warning Light for Flagman Stop/Slow Paddle	<p>Motorists on the North Carolina roadways are experiencing greater difficulties seeing our Roadway Maintenance flaggers while approaching NCDOT work zones. After several close call reports of motorists driving into the work zone buffers prior to stopping, it was deemed necessary to develop a safety device which would increase the visibility of the work zone flaggers and provide for earlier recognition of the stop/slow paddles within the work zones.</p> <p>Granville County Roadway Maintenance in Division 5 developed an advance warning flashing red light with a 12-volt mobile power source that can easily be attached to the current stop/slow paddles. Prior to approaching an NCDOT Work Zone, motorists are immediately alerted to the presence and location of the flagger. The flashing warning light is extremely effective in low visibility conditions or when the flagger is positioned in shaded areas of the roadway.</p>	OPERATIONS DIVISION 5	2001	Mark Cooney	(919) 693-8164.
Voice Activated Intercoms	<p>In the erosion control operations, two pieces of equipment are used, the Hydroseeder and the mulch blower. The hydroseeder operator is on top of the vehicle and the mulch/straw blower operator is on a trailer that is being towed by a flatbed truck loaded with straw. The operators could not communicate with the individual driving the flatbed truck since the machines were so loud.</p> <p>Division 13 Roadside Environment office purchased voice activated intercoms and headsets to aid workers in communication during the erosion control operations. The vehicle driver is able to alert the hydroseeder and mulch blower operators of low power/phone lines, tree limbs, traffic, etc. In addition, the operators can easily notify the driver if equipment has malfunctioned, or to slow down, stop or speed up.</p>	OPERATIONS DIVISION 13	2001	Keith Hill	(828) 2549590.
Lowboy Trailer	<p>disconnected from a truck. At times the truck could be 100 feet or more away from the trailer when unloading. This is very dangerous at night or in times of low visibility.</p> <p>The Division 1 Equipment team installed strobe lights in the rear taillights that work off of a battery mounted on the trailer. There is a toggle switch on the rear of the trailer that operates these lights. The battery is wired into the lights with a diode in line to keep the battery charged. The strobe lights can also be used when moving equipment to make the trailer more visible.</p>	OPERATIONS DIVISION 1	2001	Ricky Feher	(252) 426-5738
Liftgate	<p>In the past, there have been several minor muscle strains associated with lifting heavy objects into utility pick-up/trash trucks with a standard tailgate. It has always been difficult for one person to load heavy objects such as large animals and appliances alone.</p> <p>In order to reduce the risk of injury caused by lifting large heavy objects, the Caswell County Maintenance purchased a hydraulically powered liftgate (Tommylift) at a one-time cost of \$1,750.00. This liftgate will drop down flush with the ground and allow one employee to load all but the heaviest objects.</p>	OPERATIONS DIVISION 7	2001	Herbert McDowell	(336) 694-6101

Snow Plow Jacks	<p>The process of using a pry bar or lever to attach a snowplow on a dump truck is cumbersome in snowy conditions and can be hazardous. Normally three or four people are required to attach a snowplow to a dump truck (1 driver, 1 or 2 to use the lever and 1 to install the pins). In 2000, there was one injury due to a lever slipping and striking an employee on the shoulder.</p> <p>The Division 7 team recognized the potential for injuries and the difficulty of installing snowplows. The equipment department investigated the feasibility of adding a jack to the frame of the plow. Skid jacks were welded on the plow frame to adjust the height of the plow when attaching the plow to the truck.</p>	OPERATIONS DIVISION 7	2001	Paul Ingram	(336) 375-5475.
Guardrail Sign Mounts for Median Guardrails	<p>Due to the installation of the median guardrails on multi-lane highways, additional signing is needed to safely operate the herbicide spray trucks. Mounting signs in conventional stands is dangerous to both State forces and the public because workers must carry the sign stand across 2-4 lanes of highway in the face of speeding cars and trucks. The median guardrails do not allow enough room for a worker and truck to stop in the median and open doors, unload signs and racks, and safely erect the signs. Mounting the signs inside the median does not provide adequate visibility.</p> <p>Using the Equipment Unit's welding shop, the Division 9 Roadside Environmental Herbicide Crew designed a simple mounting bracket that will attach to different guardrail widths and can be used with the current roll-up type signs. It is less cumbersome than any commercial model and safer to carry across the roadway. The Division 9 team used eight sign mounting brackets with a total cost of \$96 in material and labor. A comparable cost for commercial brackets would have been approximately \$300 to \$450.</p>	OPERATIONS DIVISION 9	2001	P. H. Suggs	(336) 896-7039
NC-125 & NC-903 Rumble Strips	<p>When faced with having to repair rumble strips on NC-125 and NC-903 worn by traffic and snowplows, the Halifax Maintenance Yard began looking for a solution to having to bring in a unit from outside the maintenance yard to do this expensive work. Safety to the traveling public is compromised if these rumble strips fall into disrepair. When the accidents for three years before the rumble strips were originally installed are compared to the three years after installation, there was a noticeable reduction in preventable accidents.</p> <p>Employees at the Halifax Maintenance Yard in Division Four devised a plan to use a template to keep asphalt and 78M stone in place so it could be rolled. This was a less expensive solution than using thermoplastic, saving \$.82 per linear foot. This reduced the total cost by \$700, 37% savings. The use of a template to keep readily available stone and asphalt in place allows the maintenance yard to quickly repair rumble strips.</p>	OPERATIONS DIVISION 4	2001	Franz Enders	(252) 583-5861
Safer Intersection Work with Detours	<p>The Division 4 Construction office in Nashville needed to find a safer way to perform intersection work at NC 97 and Nashville Road in Rocky Mount. Due to the amount of traffic at this intersection, which included a significant number of tractor-trailer semis, minimizing the impact of intersection work on the traveling public while providing a safer work zone environment was essential. It was determined that a temporary road closure (one intersection leg at a time) and a temporary detour would greatly reduce exposure of workers to dangerous traffic. It would also reduce exposure of the traveling public to construction equipment, as well as eliminate intersection congestion.</p> <p>NCDOT and contractor personnel contacted the City of Rocky Mount to discuss the possibility of detouring traffic. Rocky Mount officials agreed that detouring traffic would be a safer approach; however, they also wanted to minimize the length of time the detour would be in place. The road closure for Nashville Road north of NC 97, as well as south of NC 97, was limited to one week each. Thus, the total detour time was two weeks.</p>	OPERATIONS DIVISION 4	2001	Lynn Raynor	(252) 459-2129
Flexi-Guide 300 Curb System	<p>"Gate running" at gated railroad crossings has been identified as a major problem across the nation. The NCDOT Rail Division has been using curb systems at railroad grade crossings where motorized gate arms are used and where the potential for gate running exists. The Flexi-Guide 300 Curb System was installed on May 16, 2001 at NC 42 and US 70 in Clayton, NC. Due to heavy traffic volumes and anticipated future growth in traffic volume at this intersection, the Flexi-Guide 300 Curb System was intended to deter motorists from driving around the gate crossing. The unique design of this new system combines strong color conspicuity, excellent reflectivity, and visual structure to provide an effective 24/7 deterrence to gate running. This system can easily be removed and re-bolted to the road surface when resurfacing is required. The Flexi-Guide 300 Curb System can also be used as an effective traffic-calming device in neighborhoods, as a traffic roundabout, and as a positive means for separating traffic moving in the same or opposite directions.</p>	OPERATIONS DIVISION 4	2001	Sid Tomlinson	(252) 237-6164

Mobile Concrete Transport Unit	<p>Using one 6.0 c. f. wheelbarrow or two 12-quart buckets (weighing approximately 60 pounds each) in transporting a heavy load of concrete from a concrete truck or a concrete pump truck to the concrete testing location can lead to serious back injuries.</p> <p>The construction unit in Division 4 fabricated a Mobile Concrete Transport Unit (MCTU) container using scrapped aluminum highway signs obtained from the NCDOT Division 4 Traffic Services Unit. The dimension of the container can be adjusted to accommodate whatever type of hand truck is used and does not have to be permanently attached to the hand truck. The signs can be obtained from the Division Traffic Services Office and can be welded together by any certified welder. The MCTU can be used by anyone who has to transport concrete for testing</p>	OPERATIONS DIVISION 4	2001	Michael Biedell	(252) 237-6164
Paint Handling	<p>Paint for pavement marking is currently supplied by the NC Corrections Enterprise in 30-gallon drums. It takes approximately one hour to unload the transfer truck with a six-person crew. Employees are exposed to strain, repetitive and crushing injuries. The barrels must be stored on one level, then loaded on a supply truck for use.</p> <p>The paint team in Division 13 has proposed that NC Corrections Enterprises purchase or lease totes to contain paint. Totes are 300 to 400 gallons (replaces 10-15 drums) and are reusable and stackable. A forklift is required to lift these totes and one employee with a forklift can unload a supply truck in substantially less time, and load up the empty containers. They can be unloaded from the bottom, can be strapped to a supply truck bed and unloaded without moving, and they take up less space in storage and transit. These totes are in use by private paint contractors and are available for purchase or lease from several companies.</p>	OPERATIONS DIVISION 13	2001	Jeff Moore	(828) 251-6250